PUBLIC SAFETY

PSWN PROGRAM

WIRELESS NETWORK

Saving Lives and Property Through Improved Interoperability

Boise, Idaho
Post-Symposium Report

Final

April 2001

FOREWORD

The Boise, Idaho, Public Safety Wireless Network (PSWN) Program Symposium began February 20, 2001, and concluded February 22, 2001. Booz·Allen fulfilled all of the general symposium and facility requirements and ensured that all attendees were registered on site, sign-in was monitored, and preconference materials were distributed. Booz·Allen also assisted with overall presentation support, including managing each speaker's time. All PSWN Program equipment and the remaining symposium materials were transported back to the PSWN Program Technical Resource Center (TRC) after the symposium. This document describes the key themes discussed during the symposium and includes the final attendance list. The final report will also be sent to those who attended the symposium.

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1.   INTRODUCTION

The Public Safety Wireless Network (PSWN) Program sponsored the Boise, Idaho, PSWN Program Symposium from February 20, 2001, through February 22, 2001. The symposium was cohosted by the State of Idaho; the Ada County Sheriff's Department, and the City of Boise Police Department. Previously, the PSWN Program has sponsored similar symposiums in Charlotte, North Carolina; Harrisburg, Pennsylvania; Sacramento, California; Boston, Massachusetts; Chicago, Illinois; Mesa, Arizona; Denver, Colorado; Lansing, Michigan; Orlando, Florida; St. Louis, Missouri; and Honolulu, Hawaii. The program has also sponsored a mini-symposium in Washington, DC. The purpose of these events has been to discuss issues related to the interoperability of public safety land mobile radio (LMR) communications and public safety shared systems.

At the Boise Symposium, 210 public safety officials from around the country assembled to discuss various topics relating to public safety wireless communications interoperability. Idaho's Lieutenant Governor Jack Riggs, and Ms. Pamela Ahrens, Director of Idaho's Department of Administration provided introductory remarks and the keynote address, respectively. During their comments, each acknowledged the importance of public safety communications, as well as the need for cooperation and coordination of public safety agencies. Additionally, the speakers encouraged attendees to work together and share their experiences and successes, in hopes of continuing to improve interoperability in Idaho and nationwide.

Following the keynote remarks, attendees were briefed on the PSWN Program and its overall goals and objectives. Attendees then discussed the key technical and policy issues critical to improving wireless interoperability and were able to ask public safety state representatives questions about the current state of their systems' development. Attendees were also able to learn about funding issues related to creating interoperable systems.

1.1   Purpose

This report provides a detailed summary of the events of the Boise, Idaho, PSWN Program Symposium. It is designed to be a historical resource for those who attended the symposium and to provide a broad overview for those who were unable to attend. In general, this symposium report highlights—

- Key themes that the presentations and panels supported during various portions of the symposium

- Interoperability challenges and success stories that were discussed throughout the symposium

- Important facts and information that were provided to the audience

- Answers to questions of interest that were asked throughout the symposium.

The document is organized according to the major topic areas presented at the symposium. Within each section, the key themes that emerged from consideration of a specific topic are provided and thoroughly explained using information presented during briefings and the answers to questions asked during panel sessions.

2. SYMPOSIUM TOPICS

The Boise, Idaho, Symposium was organized into six key topic areas. The session on each topic area generally lasted for a half-day of the symposium. The key topic areas included presentations from various people, ranging from members of the public safety community to PSWN Program representatives. Certain topic areas also included panels of experienced public safety officials who answered questions from the audience. The topics were selected to give the symposium attendees a sample of the PSWN Program and the state of interoperability at all levels of government. The topics covered are listed below:

- The PSWN Program Is Developing and Providing Technical and Policy Solutions to Public Safety Wireless Interoperability Challenges

- Exploring Technical Solutions in the State of Idaho

- States Are the Linchpins for Achieving Wireless Interoperability Throughout the Nation

- How Equipment Manufacturers and Emerging Technologies Can Help Foster Public Safety Wireless Interoperability

- Issues Affecting Public Safety Communications

- How Federal Initiatives Are Working to Promote Wireless Interoperability.

During the sessions, several key themes emerged. In the following sections, each topic and the related themes are presented. The themes are supported by the remarks of the presenters and panelists.

2.1 The PSWN Program Is Developing and Providing Technical and Policy Solutions to Public Safety Wireless Interoperability Challenges

Over the past several years, the PSWN Program has worked with the public safety community at the local, state, and national levels to improve public safety interoperability. During the symposium, the PSWN Program representatives described the vision for the program and several of the key activities being performed by the program. Four key themes, described in detail below, emerged during the discussions in this topic area. These themes were evident in the PSWN Program update and the discussion on the technical solutions that the PSWN Program is developing. These topics were presented during the first half-day of the symposium.

Saving Lives and Property Through Improved Interoperability

The PSWN Program vision is that of seamless, coordinated, and integrated public safety communications for the safe, effective, and efficient protection of life and property. Specifically, the program focuses on improving wireless interoperability between public safety entities at all levels of government. The PSWN Program is a federally funded program, jointly sponsored by

the Department of Justice (DOJ) and the Department of the Treasury (Treasury). The program works in partnership with local and state public safety agencies to improve interoperability.

The PSWN Program is divided into two phases. Phase I, PSWN Implementation Planning, takes place from fiscal year (FY) 1997 through FY 2001. During Phase I, the PSWN Program performed an integrated set of studies and evaluations of existing public safety wireless interoperability systems and developed pilot projects. These activities resulted in a knowledge base known as Public Safety WINS: Wireless Interoperability National Strategy.

Public Safety WINS presents the program's strategy for improving interoperability throughout the Nation. Public Safety WINS will serve as an information baseline for the program as the program begins to offer interoperability services to local, state, and federal public safety entities. Public Safety WINS is being developed as a multimedia package that includes video and CD-ROM. The video portion of Public Safety WINS was shown at the beginning of the Boise Symposium.

Currently, Phase II, PSWN Interoperability Assistance offers a suite of services that assist the public safety community with the execution of Public Safety WINS. These services include providing an information clearinghouse and offering interoperability assistance to public safety agencies with specific interoperability issues. Phase II takes place from FY 2002 through FY 2006.

Improving Interoperability Requires Comprehensive Coverage of Key Issues

The PSWN Program is active in five key issue areas that must be addressed to improve interoperability. The issue areas, and how the PSWN Program is addressing them, are provided below.

- **Coordination and partnerships**. Improved coordination and partnerships within the public safety community is critical to improving interoperability. In an effort to facilitate new partnerships, the PSWN Program has provided briefings for speakers at annual conferences of national public safety associations. The program also hosts regional symposiums to bring together public safety officials to share their ideas and experiences with others. The program and the National Institute of Justice will cohost a National Interoperability Forum this fall that will bring together state decision makers, elected and appointed officials, and public safety executives to encourage the policy community to initiate or continue steps to improve interoperability.

- **Funding**. Limited funding for communications is a major issue faced by the public safety community. The program has developed reports and guides that highlight the issues related to upgrading and replacing public safety wireless systems and discuss sound funding strategies for the life cycle of a communications system.

- **Spectrum**. The PSWN Program recognizes that spectrum is a limited resource. The program is supporting efforts to try to acquire more spectrum for public safety and to make rules that flexibly allow interoperability.

- **Standards and technology**. The development of standards and open-systems architectures is a key issue that must be addressed to make progress toward improved interoperability. The program also partnered with the Criminal Justice Information Services Division of the Federal Bureau of Investigation (FBI) to assess the integration feasibility of National Crime Information Center (NCIC) 2000 through its Wireless Applications Test Program (WATP) of hardware and software.

- **Security**. To ensure that its communications systems are secure, the public safety community needs to incorporate both physical and system security measures so that public safety agencies can effectively and efficiently carry out their critical operations. The PSWN Program is developing recommended security guidelines for digital LMR systems, and is building security policy and security planning templates to assist radio managers in designing their system security policies and procedures.

Technical Solutions for Public Safety Wireless Communications Interoperability Are Available Today

The PSWN Program is working with local, state, and federal entities to conduct interoperability pilots throughout the Nation. These pilot projects allow the PSWN Program to demonstrate interoperability solutions on active systems. The program hopes that these pilots will help initiate future development of interoperable systems. Pilot projects are under way in Salt Lake City, Utah; along the Southwest Border; along the Vermont/New Hampshire border; in South Florida; and in Washington, DC. In addition, the program is assisting the State of Montana and has recently completed a pilot project in San Diego, California. These pilot projects were discussed, in detail, during the symposium. Brief descriptions of the pilot activities are provided below:

Salt Lake City. The PSWN Program is supporting the Utah Communications Agency Network in Salt Lake City. Specifically, the program is working to develop a software solution to connect two 800 megahertz (MHz) systems in the Salt Lake City area. The solution ties the two systems together using Motorola's Omnilink product to provide seamless roaming over a contiguous area. The pilot is also exploring the use of shared talk groups to improve interoperability among federal agencies in the area. Additionally, the intention is to support critical, interoperable communications during the 2002 Winter Olympic Games and into the future.

Southwest Border. The PSWN Program is attempting to demonstrate wireless connectivity between two systems using different trunking protocols (i.e., a Motorola system and a ComNet Ericsson system) in El Paso, Texas, and Las Cruces, New Mexico. The project entails installing a radio from each of the systems into the other system's backbone and setting up a transmitter that can transmit signals directly from one jurisdiction into the other.

New Hampshire/Vermont. The PSWN Program is working to address cross-border interoperability issues along the New Hampshire and Vermont border. The main objective of the project is to implement a solution that allows users to cross into the other state and either talk on their "home" system or on the other state's system. The preferred solution is to install mobile radios compatible with the New Hampshire system into the Vermont State Police vehicles.

Further, a solution that will link the two states' microwave backbones together is also being researched.

South Florida. The PSWN Program is working to develop a solution for interoperability in three South Florida counties: Broward, Dade, and Monroe. The program is hoping to provide interoperability between federal and local public safety agencies that would need to communicate should a mass migration of immigrants from Cuba occur. The program is attempting to provide console-to-console connectivity between the participants and link disparate systems by deploying three JPS ACU-1000 switches in the area. The program is also investigating reprogramming available mutual aid channels into existing radios as a means for providing interoperability.

Washington, DC. The PSWN Program is working to address unique issues in the Washington, DC, Metropolitan Area, which includes portions of two states, Maryland and Virginia, all of the District of Columbia, and a large presence of federal agencies. The goal of the pilot is to provide interoperability by connecting participants in different frequency bands. Most of the local agencies in the area are on 800 MHz systems while the states are on very high frequency (VHF) high band and low band systems, respectively. The federal agencies operating in the area use primarily VHF radios. The program is working to connect local, state, and federal agencies using either a switch concept or tri-band repeaters.

San Diego. The PSWN Program has recently completed a pilot project in the San Diego, California, area. The project's objective was to improve interoperability between the Regional Communications System, which provides communications for 161 agencies in San Diego and Imperial counties and Federal Government agencies operating in the area. Additionally, the pilot was designed to demonstrate interoperability across disparate frequency bands and radio systems. The PSWN Program developed a transportable communications system to demonstrate this interoperability. Specifically, the pilot used a JPS ACU-1000 switch, which was deployed in a mobile command vehicle, to connect the participants. The PSWN Program provided radios that were added to a mobile command van, as well as some of the labor needed to integrate the switch into the van. The solution was successfully demonstrated during a field exercise in May 2000.

The PSWN Program Is Seeking to Provide Direct Interoperability Support to the States

The program recognizes that the states are the linchpins for implementing interoperability throughout the Nation. Therefore, the program is seeking to provide direct support to individual states by initiating a dedicated state interoperability campaign. The objective of the campaign is to encourage the trend toward statewide systems development and to provide leadership and expertise on interoperability issues. As a part of the state campaign, the program will work to establish or participate in forums that are tasked with improving public safety wireless communications with their respective states.

2.2   Exploring Technical Solutions in the State of Idaho

The State of Idaho has several exciting communications efforts under way. During the symposium, representatives of local public safety agencies discussed many of these efforts. These topics were presented during the second half-day of the symposium.

The State of Idaho is Modernizing Their Existing System

Idaho's public safety communication network consists of 86 sites and covers approximately 1,200 miles. Currently, the system's microwave backbone is undergoing an eight-year modernization effort to upgrade it to a digital system at a cost of $14.5 million. This upgrade is scheduled for completion in 2003. The existing system is a collocated, analog conventional system that uses digital trunked two-way radios. The current system is organized into six districts covering more than 82,000 square miles. It provides service to the Idaho State Police, the Idaho Transportation Department, the Bureau of Emergency Medical Services, Idaho Public Television, the Bonneville Power Authority, the United States Forest Service, and the FBI.

The upgrade will double the existing capacity for public safety use, permit the distribution of digital broadcast television for Idaho Public Television, provide additional capacity to foster better delivery of services to Idaho's citizenry, take a step closer to a seamless communication system, and provide for less agency duplication.

Many Challenges to Interoperability Exist in Idaho

The geography of Idaho alone is a challenge. The state's population is just over 1 million, of which 43 percent is rural. The state faces challenges with regard to its climate and weather; equipment is often covered in snow and ice. Similar to the states adjoining it, Montana and Utah, Idaho faces challenges with the terrain; with only three analog 800 MHz trunked radio repeaters on mountain tops, there is little coverage.

As do most states, Idaho struggles to obtain funding for its system. Funding for Idaho's system is mainly through state legislature allocations. Although the state legislature has been cooperative, as the state population has grown, the budget unfortunately has not.

Partnerships Across Governmental Levels Are Improving Interoperability in Idaho

The State of Idaho shares its resources with both state and federal agencies. For Idaho's success, collaboration has been the key to making the public and private, as well as the government-to-government, solution model work. Under Idaho's Department of Administration, the Information Technology Resource Management Council facilitates a centralized approach to the acquisition and evaluation of necessary technical information and the informed development of a statewide strategic plan to ensure a coordinated approach to the design, procurement, and implementation of the shared system. Some of the agencies participating in Idaho's shared system are Idaho State Police, Idaho Transportation Department, the Bureau of Emergency Medical Services, Idaho Public Television, the Bonneville Power Authority, the United States Forest Service, and the FBI.

2.3 States Are the Linchpins for Achieving Wireless Interoperability Throughout the Nation

Statewide infrastructures are quickly becoming the most efficient, cost-effective way to improve interoperability around the country. Planning statewide systems, however, is a difficult task. Many states around the country have implemented, or are implementing, shared, statewide systems. During the symposium, representatives from Alaska, Colorado, Michigan, Nevada, and Utah shared their experiences with statewide systems development. Several key themes, described in detail below, emerged during the discussions in this topic area. These topics were presented during the third half-day of the symposium.

States and Regions Are Successfully Implementing Shared, Interoperable Wireless Systems

Alaska. The State of Alaska has initiated a project, the Alaska Land Mobile Radio System (ALMRS), to provide, on a non-interference basis, a seamless, interoperable radio communications to the Department of Defense (DoD), federal and state agencies, and local governments. ALMRS is unique because it is being developed by the DoD, federal agencies, and the State of Alaska. ALMRS will provide a totally interoperable statewide infrastructure that can be used for daily operations and multiagency emergency response. Agencies that want to participate in the system must provide their own end-user equipment. ALMRS is being designed and implemented using a four-phase, four-zone approach. Because of the lack of infrastructure, ALMRS is using satellite for coverage over the northwest and southwest areas of the state. It is envisioned that ALMRS will be fully implemented by 2002.

Colorado. The State of Colorado has been working toward a statewide digital trunked radio system since 1991. In 1999, a contract with Motorola was signed to start work on the state's SmartZone system. The system has been divided into seven phases over a seven-year span. Currently, the first four phases have been completed; the remaining three are contingent on funding. Based on the cost of current phases, the estimated cost of this system is approximately $76 million. The project boasts more than 35 counties, cities, and local agencies participating in the system. A beta test of the state's voice-over-Internet-Protocol (VoIP) system begins early next year.

Michigan. The State of Michigan has been a leader in the development of statewide systems for years. In the state, the Michigan State Police are serving as the lead agency in developing a digital, trunked, Project 25-compliant, 800 MHz system for use by all state agencies and interested federal agencies and local governments. The primary vendor for the system is Motorola. The key feature of the system is that it provides intra-agency interoperability statewide. Michigan is funded to provide the infrastructure while federal and local agencies that wish to participate on the system provide the end-user equipment. The system is costing the state approximately $200 million.

Michigan's system is being developed in four phases. The first three phases are complete, and 120 tower sites are operational. Phase four covers the upper east and west peninsula of Michigan. The 61 towers in this phase are under construction. The system currently has more than 2,800 subscribers from all levels of government. An additional 12 local jurisdictions intend to join the system. As new participants join the system, they

discover the benefits of a shared system and as members incur only minimal cost to use the backbone of the statewide system. Michigan plans to upgrade the first three phases of the system throughout 2001 to offer integrated voice and data. For more information on the Michigan system, interested parties can visit its Web site at www.mpscs.com.

Nevada. The State of Nevada is currently operating two separate systems; an 800 MHz trunked radio system, known as the Nevada Shared Radio System, and a VHF high-band trunked radio system, known as Nevada Statewide Trunked Radio System. Both systems are set to work statewide. There are several differences between the systems including the participants in each system. The proposed 800 MHz system has 57 sites and will offer voice, mobile data, and telemetry, with 1,400 radios in service. The VHF system has 54 sites and offers only voice, with 1,600 radios in service. The cost of the VHF system is almost 2 1/2 times more than the 800 MHz system. The VHF system is not considered a "shared" system but an "open" system. The 800 MHz system was contracted with ComNet Ericsson and the VHF system with Motorola.

Utah. The State of Utah formed the Utah Communications Agency Network (UCAN) as a quasi-state agency serving as a board of directors for the development of a public safety communications system. Currently, the system is 90 percent complete. The system purchased was a Motorola SmartZone, and in 1998 it was Motorola's largest "Smart" system. In response to the financial restrictions imposed on some of the more than 55 participants, the system offers both analog and digital capabilities. UCAN is the radio infrastructure provider; dispatch centers remain under existing management structures. Natural consolidations have taken place on a regional basis with shared central electronics and shared networks such as T-1, microwave, and fiber.

Public Safety Agencies Must Consider Several Key Issues When Planning Statewide Systems

Planning statewide systems can involve technical issues, political considerations, and coordination with peers in other organizations. As states nationwide have completed this process, several best practices have emerged. During the symposium, representatives from various states shared their experiences and some of these best practices. These best practices and additional considerations for developing statewide systems are listed below.

- **Executive-level support**. Senior government support is critical for successful statewide systems. Political champions can give a project credibility, ensure funding for the project's survival, and argue for the project against opposition. These individuals also provide needed support during the legislative process and in supporting requests for funding public safety wireless communications systems.

- **Buy-in from local entities**. Most successful statewide systems have found ways to involve local agencies in gaining support for system development. Well-developed and consistent presentations to important existing and potential stakeholders, including the use of professional quality videos, help obtain and maintain buy-in from the government executives, legislatures, the citizenry, and other key stakeholders.

- **Memorandum of understanding (MOU)**. An MOU is a detailed agreement that describes the purpose and intent of the shared system, defines the users, and defines the owner/operator responsibilities. MOUs are sometimes used to forge partnerships and are instrumental in the early stages of planning and partnering. The MOU often allows communication lines to be opened.

- **A shared vision**. A compelling vision, with an understanding of the urgent need to improve public safety communications, is required to achieve the needed level of support. Furthermore, the state must be willing and able to assume integration responsibilities for the system and work to overcome turf and coordination issues with local and federal partners.

- **Site acquisition**. Public safety agencies should be aware of environmental and land-use regulations as they prepare to develop their sites. Often local governments have stringent limitations on tower siting, and resolving such issues can be difficult and time consuming.

Obtaining Funding for Large, Statewide, Wireless Communications Systems Is Possible

Obtaining funding is the critical first step in making statewide systems a reality. Acquiring the major funding needed to plan, build, and maintain a public safety communications system may be one of the greatest challenges of public safety agencies. In fact, this process often takes at least five-to-ten years to complete. Another problem is that agencies do not typically consider life cycle cost issues when planning a system and therefore find unexpected costs arise during the system's life. As states have proceeded through this process, several common keys to success have emerged. During the symposium, officials who have funded statewide systems shared some of these keys to success with the audience. Several are described, in detail, below.

- Agencies must have a project-planning champion in a political arena. Ideally this champion would have decision-making authority and the capability of accessing funds to support the project.

- Officials planning statewide systems should use consultants for unbiased information to help them develop business plans and validate the large dollar amounts needed to develop these systems. Business plans must describe, in detail, what efficiencies will be gained and what services can be improved by using the new system. Consultants can also help to sell the business plan at county meetings and board meetings.

- Often agencies have a misconception that buying a radio system is a onetime purchase, and they fail to realize that costs do not end when construction does. Agencies should be aware that they need to cost these systems for their entire life cycle. Because technology becomes obsolete quickly, agencies must plan to include upgrades in the contract.

- Federal and state grants are another way that states can fund interoperable systems. Three grants are administered by the Bureau of Justice Assistance (BJA): the Byrne Formula Grant program, the Byrne Discretionary Grant program, and the Local Law Enforcement Block Grant program. The BJA also helps to raise the level of awareness at the state and local levels that the Federal Government is interested in advancing technology in the public safety sector.

2.4 How Equipment Manufacturers and Emerging Technologies Can Help Foster Public Safety Wireless Interoperability

Wireless data is among the latest emerging technologies having an impact on public safety communications. Wireless data is also proving to be a viable solution for interoperability among public safety agencies operating on disparate radio systems. Many states are developing statewide data systems or upgrading their voice systems to be data capable. During the symposium, a representative from North Carolina shared the successes of a statewide data system. The Federal Government has also identified use of wireless data technology and several other key issues as important to improving interoperability. Presentations on these topics were also made during the symposium. Several key themes, described in detail below, emerged during the discussions in this area.

States Are Developing Wireless Data Networks as a Means To Achieving Interoperability

A number of wireless data systems are being developed nationwide. These systems are providing an alternative way to address many interoperability challenges. The speaker from North Carolina highlighted their statewide data system during the symposium. The system is described below:

Criminal Justice Information Network (CJIN). The State of North Carolina is implementing an 800 MHz private data network known as the CJIN. The goal of CJIN is to make mobile data available to all public safety agencies within the state. Its stated objectives include improving officer safety, increasing officer efficiency and effectiveness (i.e., reduce paperwork, reduce errors, achieve better use of staffing), and improving interoperability. North Carolina elected to build its data system privately because cellular coverage was not available in all areas.

To date, the state has implemented the system on 114 base stations. More than 500 law enforcement agencies and a total of more than 5,000 users are now using the system. Approximately 95 percent of the state is currently covered. The cost of the project will be about $16 million. The state was able to keep the cost low because the system was built with shared resources. The state provides the base stations, data transmitters, and access to the 800 MHz system while local agencies provide tower space, tower houses, and use of spare 800 MHz frequencies available in their area.

The Federal Government Is Investigating Interoperability Using Wireless Data

The Federal Government is testing wireless data applications for the public safety community through the NCIC. The NCIC was created by the FBI in 1967 to help criminal justice agencies improve their operations by providing a nationwide information system to support investigations. The system is undergoing a major upgrade known as NCIC 2000. The success of NCIC and its increased usage, coupled with technological advances such as mobile data terminals, laptops, and increased capabilities of local, state, and other federal systems, led to the NCIC 2000 initiative. During the Boise Symposium, representatives of the NCIC's WATP briefed attendees on the current status of activities within their program.

NCIC 2000 will provide many features in addition to its current offering. These enhanced features include fingerprint images, enhanced name searches, probation and parole lists, online manuals, improved data quality, information linking, mug shots, other images (e.g., vehicles, boats, or vehicle and boat parts), convicted sex offender lists, access to SENTRY (an index of individuals incarcerated in the federal prison system), delayed inquiry, and an online ad-hoc inquiry. NCIC 2000 went online in July 1999 and transmitted its first mug shot using Cellular Digital Packet Data (CDPD) technology on August 18, 1999.

The PSWN Program has worked in conjunction with WATP to evaluate the feasibility of integrating NCIC 2000 into various mobile data communications systems. This joint effort assessed the reliability and ease of use of the NCIC 2000 hardware and software in different wireless environments. It also assisted in developing guidelines for interface to various wireless communications and increased liaison support between local, state, and federal criminal justice agencies on mobile data communications. The test program involves more than 40 vendors, eight public safety agencies, and four different infrastructures (e.g., CDPD, private voice/data system). WATP's next steps include testing these technologies in an operational environment.

Innovative Approaches and New Technologies for Improving Public Safety Communications Interoperability

As key players in improving interoperability, equipment manufacturers presented their equipment in use today and equipment entering the market in the near future. The Boise Symposium was the first PSWN Program symposium in which vendors were invited to give individual presentations about their latest technologies applicable to public safety wireless communications. The vendors presenting were Communications-Applied Technology, E.F. Johnson, Motorola, JPS Communications Inc., Nextel Communications, TMI Communications Inc., Thales (Racal) Communications, and SatCom Systems, Inc. The representatives answered questions directly from the users and were asked to comment on future plans for their products. Highlights of their presentations are provided below.

Vendors See Many Challenges in Improving Public Safety Communications Interoperability

The equipment manufacturers were optimistic about the future but still see many challenges that prevent interoperability in the public sector. First, it was noted that true unit-to-unit interoperability cannot happen without open standards. Additionally, the lack of standards

creates procurement and competition problems that limit innovation in the marketplace. Another problem is the public safety community's continued reliance on proprietary systems, which many vendors believe is not in its best interests in the longer term. Additionally, equipment manufacturers agreed that there was confusion among users about how to migrate their systems given the rapidly advancing technology. Finally, there seemed to be confusion in the marketplace about Federal Government mandates.

Standards Are Necessary for Public Safety Wireless Communications Equipment

As stated above, standards are essential to the development of future radio systems if interoperability is to be achieved. Currently, there are standards for most, if not all, major electrical components (e.g., VCRs and computers), but there are only a handful of standards for LMR systems. Although certain standards have been generally accepted, none has been widely adopted, limiting competition and the development of new features for users.

The most widely accepted standard in the United States is Project 25. To date, more than 300 Project 25 systems have been deployed. Project 25 is being developed in two phases. Phase I focuses on developing a common air interface for digital systems and standards for frequency division multiple access (FDMA) technologies only. Motorola, E.F. Johnson, and Thales (Racal) representatives all indicated they were developing Phase I compatible equipment. Project 25 Phase II focuses on developing standards for both FDMA and two- and four-slot time division multiple access (TDMA). Phase II has three solutions: an FDMA solution, similar to Phase I, with compression to 6.25 kilohertz (kHz); a four-slot TDMA solution that uses a 25 kHz channel; and a two-slot TDMA solution that uses a 12.5 kHz channel and supports 36 kilobits (kb) of data throughput. ComNet Ericsson supports the development of the Phase II TDMA standards.

Innovative Approaches and New Technologies Are Under Development
for Wireless Radio Communications

A portion of the vendor discussion was spent on innovative and future technologies that may change the way public safety wireless networks are developed. These technologies included switching devices, voice-over-Internet-Protocol (VoIP), and satellite systems.

- **Switching Devices**. New switching technology is making it possible to rapidly connect disparate systems. This technology is most useful during tactical and emergency response situations. JPS Communications has developed the ACU-1000, which serves as an intelligent interconnect across multiple bands.

- **Voice-Over-IP**. VoIP offers an interesting opportunity to public safety. The technology would allow radios to use the Internet as the primary backbone and bring all of the associated benefits to public safety. Most vendors agreed that in the future, all public safety networks would be based on VoIP technology. Several vendors suggested that they would have VoIP products very soon. VoIP, however, has a significant number of challenges, a number of which are specifically related to the public safety environment. Most of the concerns reflect the potential problems with

public safety's mission-critical environment. Principally, public safety must have a guarantee that the bandwidth they need will always be available.

- **Satellite**. Satellite service is an emerging solution for public safety communications. This solution is attractive because it takes public safety out of the infrastructure game all together. It is similar to a terrestrial trunked radio system. An existing problem is that cellular does not reach all places, and LMR in certain areas is limited because of the lack of infrastructure.

2.5 Issues Affecting Public Safety Communications

The PSWN Program Has Recognized Security as an Important Issue Related to Interoperability

The Federal Government, through the PSWN Program, has identified five key issue areas related to interoperability—coordination and partnerships, funding, spectrum, standards and technology, and security. The program has performed a variety of studies and analyses related to these issue areas. At the symposium, the program overviewed system security and highlighted how developing system security guidelines and policies for wireless radio systems were often overlooked. The program also encouraged audience members to recognize security needs as a critical part of their thinking as they develop and upgrade systems.

The PSWN Program has developed a number of short-term solutions to communications security. They are—

- Agencies must raise awareness of systems security threats.

- Because technology to monitor radio systems is being developed and improved constantly, administrators must look at nontraditional risks to their systems.

- Agencies can take steps to ensure the security of information transmitted on their radio systems.

- Agencies can take steps to protect the integrity of data in their computer systems.

- Agencies can take steps to ensure their systems are available during disasters or unplanned outages.

The PSWN Program has also developed several tools to help agencies in their security planning. These tools include—

- *The Public Safety Communications Security Awareness Guide,* which highlights security vulnerabilities and identifies actions that governmental leaders and public safety agencies can take to address security problems.

- *The Digital Land Mobile Radio System Security Guidelines Recommendations*, which offers a set of security guidelines specifically designed for digital LMR systems.

- *The Land Mobile Radio System Recommended Security Policy,* which is designed to help agencies developing their own system security policy.

- *The Land Mobile Radio System Security Planning Template*, which is designed to be used as a model that can be tailored to any public safety wireless system.

- *The Land Mobile Radio System Risk Assessment Methodology*, which allows radio managers to identify and determine countermeasures to mitigate potential risks identified.

2.6 How Federal Initiatives Are Working to Promote Wireless Interoperability

Federal agencies have been charged by the Congress to consolidate communications systems, limit spending, and create interoperable solutions with other federal agencies. Where appropriate, federal agencies intend to partner and share resources with state and local public safety agencies. During the second half-day of the symposium, representatives from federal agencies briefed the audience on their systems. The main purpose of this topic area was to discuss certain large-scale federal system developments and federal initiatives related to wireless data and security. One key theme emerged in this topic area. The theme is described in detail below.

Federal Agencies Are Developing and Upgrading Wireless Systems Throughout the Country

DOJ, Treasury, and the United States Coast Guard are involved in implementing large-scale networks of wireless communications systems. In each of these efforts, federal agencies are seeking to partner with state and local agencies. The Federal Government also plans to partner in jurisdictions where it has overlapping system requirements with state and local agencies. These partnerships are effective because of the economies of scale of large, shared system projects. Representatives from each group's program office were at the Boise Symposium to discuss their ongoing progress. A summary of this discussion is provided below:

DOJ. DOJ is implementing significant changes in its communications systems. It has established a Wireless Management Office (WMO) to centralize oversight, management, and procurement of a common Justice Wireless Network (JWN). The WMO is working to consolidate a number of disparate systems, augment its network with commercial services, consolidate equipment procurements, and improve interoperability within the department and with outside agencies. DOJ is implementing pilot projects that consolidate DOJ components onto single systems and demonstrate improvements in interoperability.

The JWN is being built on an aggressive schedule, moving from the west coast to the east coast. The WMO has divided the country into four zones (western, central, east, and northeast). The WMO has begun planning and implementation in zones 1 and 2 (western and central). These zones were selected to take advantage of existing resources and narrowband assets, to support communications for the 2002 Olympics, and to support operations along the southwest border of the United States. The goal for FY 2001 is to complete the San Diego and Salt Lake City pilots. JWN is scheduled for completion during 2004.

Treasury. Treasury is also planning to implement a nationwide wireless system to support all of its components on a shared infrastructure. Treasury is planning to implement a TIA/EIA-102 (Project 25) compliant narrowband radio system known as the Integrated Treasury Network (ITN). It has established the Treasury Wireless Program Office (WPO) to manage the development of ITN. The WPO is also responsible for the design and implementation of ITN and is working to develop partnerships to use non-Treasury-owned systems, both state and federal.

The WPO also is developing a phased regional approach for implementing the ITN. The WPO has identified six phases for implementation, the sequence of which will be based on mission priorities. Treasury is continuing to examine several issues that will add more value to the ITN proposition. For example, WPO is examining a detailed transition plan from legacy systems to the ITN and exploring centralized management and operations and detailed capacity planning for conventional versus trunking determinations. WPO is also researching a mix of solutions that includes commercial services, sharing with local entities, and fee-for-service solutions.

Department of the Interior (DOI). In 1996, DOI adopted the TIA/EIA-102 (Project 25) standards and has a record of longtime partnerships with local, state, and federal entities. The vision is to have senior leadership committed to sharing, conserving resources, and using technological advances. Some of the projects include the Montana initiative with the Bureau of Land Management and the Southwest Colorado initiative with the U.S. Department of Agriculture's Forest and Park Services.

U.S. Forest Service. The U.S. Department of Agriculture's Forest Service is in the process of converting its radio system from narrowband, and the conversion is 70 percent complete. Like DOI, the Forest Service has a long history of sharing resources including sites, towers, buildings, maintenance, and dispatch.